

# Criteria for the identification of significant ecological areas in Auckland

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# Contents

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<b>1</b>	<b>Introduction</b>	<b>4</b>
1.1	Purpose	4
1.2	Legacy and other council ecological assessment criteria	5
1.3	Approach proposed by Wildlands	6
1.4	Defining the Auckland Council approach	7
1.4.1	Issues with the Wildlands approach	7
1.4.2	A new assessment system for Auckland	8
1.5	Other uses of significance criteria	10
1.6	Inclusivity	11
<b>2</b>	<b>Approach</b>	<b>12</b>
2.1	Inclusion / exclusion approach	12
2.2	Methodology	12
<b>3</b>	<b>Suggested new criteria</b>	<b>13</b>
3.1	Representativeness	13
3.2	Threat status and rarity	14
3.3	Diversity	15
3.4	Stepping stones, migration pathways and buffers	15
3.5	Uniqueness or distinctiveness	17
<b>4</b>	<b>Other factors to consider</b>	<b>18</b>
4.1	Viability	18
4.2	Ecosystem services	19
4.3	Data deficient	20
<b>5</b>	<b>Definitions</b>	<b>21</b>
<b>6</b>	<b>Bibliography</b>	<b>22</b>
	Table 1: Legacy and other council ecological assessment criteria	24

# 1 Introduction

## 1.1 Purpose

Auckland Council is required to identify areas of significance for biodiversity under national legislation as well as its own statutory and non-statutory plans. Biodiversity includes terrestrial, marine and freshwater ecosystems, habitats and species.

Protection of significant indigenous vegetation and significant habitats of indigenous fauna is a matter of national importance under the Resource Management Act 1991 (Section 6c). The Act also requires maintenance of indigenous biological diversity (Section 31) and that the potential of natural [biological diversity] resources to meet the reasonably foreseeable needs of future generations be sustained (Section 5). The identification of indigenous biodiversity and its protection and restoration has also been identified as an issue of national importance in New Zealand's Biodiversity Strategy (Department of Conservation/MfE 2000). In particular biodiversity goal 3 of this strategy is to maintain a full range of indigenous biological diversity and enable its persistence (and continued evolution) into the future.

Policy 11 of the New Zealand Coastal Policy Statement (DOC 2010) refers to the protection of indigenous biological diversity in the coastal environment. Auckland Council's Biodiversity Strategy (Auckland Council 2011) provides strong direction for the protection of biodiversity. It includes a vision for biodiversity that "we value and want to see:

- Healthy and diverse ecosystems of plants and animals
- Engagement, understanding and guardianship of Auckland's indigenous biodiversity
- Ecosystem services provided by indigenous biodiversity
- And Integrated management resulting in biodiversity gains"

This strategy has eight objectives including the conservation of the greatest number and most diverse range of Auckland's indigenous ecosystems and sequences (Objective 1); the long-term recovery of the greatest number of threatened species whose range includes the Auckland Region (Objective 2); and the maintenance and enhancement of the goods and services provided by the natural environment in a way that supports indigenous biodiversity (Objective 3).

The draft National Policy Statement for Biodiversity requires that significant biodiversity is identified in Council's Plans. The development of the new Unitary Plan for Auckland has provided an opportunity to revisit ecological significance criteria and how significant ecological areas (SEAs) are identified in the plan. The Natural Heritage team commissioned a review of ecological significance criteria by Wildland Consultants (Myers 2011) for the preparation of the Auckland Councils new Unitary Plan (in preparation). The review described the history of the development of significance criteria in New Zealand to date and discussed the pros and cons of various approaches.

This report presents proposed new significance criteria based on Myers (2011) as well as further assessments of how the criteria will be applied, what information will be used to assess

each criterion, and how the information will be communicated to landowners. Some changes from Myers (2011) include: reducing repetition (same data being applied to different criteria), clarifying and making more precise criteria. The review also provided an opportunity to consider the use of criteria for assessing significance in marine and coastal ecosystems to propose significant ecological areas across land and sea in one schedule. We also needed to provide quantitative methods to assess significance. This was achieved through the increased use of criteria that can be measured such as a quantification of the representative criterion, the inclusion of threatened ecosystems and unique elements of the regions biodiversity. It is hoped this may avoid unnecessary and costly litigation based on misunderstandings of the Councils position. It would also provide Council staff, landowners, community groups and ecological consultants with greater certainty about what is significant and greater understanding about why.

Problems created by past approaches to assessing significance have been discussed by various authors (see Gibson 2001, Walker et al. 2008). Gibson suggested that policy-makers and process designers “sometimes embrace vagueness as a means of preserving discretionary flexibility and contextual adjustability”. He argued that constructive ambiguity might be helpful in keeping representatives of competing interests at the table but that this vagueness could be costly. Walker et al (2008) suggested that “ambiguity yields statutes and regulations obscure enough to please all parties, vague enough to be unenforceable, and so ill-defined that failures to implement the policy will be difficult to detect and impossible to litigate. Ambiguous policies sound lofty but may accomplish little.”

Gibson also noted that participants in environmental assessments appreciate the need to adapt assessment obligations to suit different undertakings, locales and expectations. However, reinventing the rules for every specific case is likely to bring intolerable uncertainty and unduly attenuated deliberation (Gibson 2001).

## 1.2 Legacy and other council ecological assessment criteria

Some of the legacy councils in Auckland included terrestrial, wetland and riparian significance criteria in their district plans. Some were used only for assessing significance for certain processes such as bush-lot subdivision assessment (e.g., Rodney) rather than the identification of significance sites. No legacy council used criteria for the assessment of marine significance.

Some examples of assessment criteria for various approaches throughout New Zealand and for a number of legacy councils in Auckland are shown in Table 1 (see end of document). This highlights the relative consistency in approaches taken by local government to the identification of significant areas with common themes being used across most, if not all councils. This table also includes the proposed Auckland approach to assessing significance so that a comparison between the various approaches can be made.

### 1.3 Approach proposed by Wildlands

Eight criteria for assessing significance were proposed by Wildland Consultants (Myers 2011), based largely on approaches used nationally for many years stemming from the Protected Natural Area Programme started in the 1980s (see Kelly and Park 1986). Myers (2011) criteria are:

- a. Representativeness
- b. Diversity and pattern
- c. Rarity
- d. Naturalness
- e. Long-term viability
- f. Size and shape
- g. Buffering and surrounding landscape
- h. Habitat Values

For each of these criteria Wildlands provided a description of how the criterion should be assessed (Myers 2011). Representativeness was the primary criterion proposed as it is still regarded internationally as a fundamental concept for nature conservation (O'Connor et al 1990). It is based on the concept that a reserve system should contain the full range of natural ecosystem variation of an area (Norton and Roper-Lindsay 2004).

Myers (2011) suggested a number of other possible criteria could be used such as the importance of a natural area to Tangata Whenua, the involvement by the community in the maintenance and restoration of the area or public appreciation of the aesthetic value of the area. These have been used elsewhere in New Zealand (see Table 1 at the end of this document.) For example, the regional policy statement of Greater Wellington Regional Council and Franklin District Council both provided for the importance of an area to Tangata Whenua.

The proposed Wildlands approach took into account the state of biodiversity in a region or district, the specific ecological values of a district or region, and the implications for the proposed criteria and how the criteria could be applied in a practical way.

Wildlands applied a series of principles in the development of these criteria:

- Ensure stand alone criteria
- Keep management and protection issues separate from significance assessment
- Take a broad approach to significance assessment so that the full range and diversity of biodiversity is addressed and not just the best sites;
- Include all aspects of representativeness and moderate value sites, not just best examples or areas of high significance;
- Address the full range of indigenous biodiversity;
- Do not use viability and sustainability as filters for significance;

- Take a landscape approach to significance assessment;

## 1.4 Defining the Auckland Council approach

Auckland Council's assessment of significance for the purposes of the Unitary Plan is based on two main factors and the criteria in Section 3 below were developed with these in mind:

- Does the vegetation or fauna habitat contribute to the on-going maintenance of biological diversity, including the full range of New Zealand's indigenous biological diversity, and enable its persistence (and continued evolution) into the future?
- Is the vegetation or fauna habitat important for achieving the objectives of the Auckland Council's biodiversity strategy?

In general, a site important for the maintenance of biological diversity will be 'significant'. As proposed by Walker et al (2008), "in assessing significance for biological diversity, uncertainty needs to be managed by adopting precautionary, inclusive, and attainable criteria (low bars) if the goal is to guard against irreversible harm". For that reason, we propose five criteria that provide for the maintenance of biodiversity Auckland-wide. They are as follows:

- a. Representativeness
- b. Threat status and rarity
- c. Diversity
- d. Stepping stones, migration pathways and buffers
- e. Uniqueness or distinctiveness

Indigenous vegetation that meets any of these criteria will be regarded as significant for the purposes of the Unitary Plan Significant Ecological Area Schedule. This approach was developed as an alternative to the Wildlands approach (Myers 2011) in an attempt to remove duplication, provide greater clarity in language and to improve the quantification of, and certainty surrounding, a significance assessment. As Judge M. Harland said at the 2012 Environmental Law and Regulation Conference "make it a goal to draft clear and understandable documents, free as far as possible from jargon, acronyms, inconsistencies and repetition. Some of the language used has become so removed from the understanding of average people that it has become obtuse and invites challenge".

### 1.4.1 Issues with the Wildlands approach

A number of potential difficulties were determined in the application of the criteria as proposed by Myers (2011). These problems were that:

- There was little in the way of guidance provided to quantify significance or to expressly define exclusions;
- The language used was sometimes ambiguous;

- Some criteria were identifying priorities for management rather than determining significance; and
- There was some repetition in the inclusions of the same attributes for several criteria

In testing the Wildlands criteria using case-studies we found the same site attributes were being used to determine significance under more than one criterion. That is, the same site attributes were leading to a site being regarded as significant under several different criteria. This repetitiveness in the criteria could be perceived by landowners as “double dipping” where one site attribute is rated highly for more than one criterion. For that reason duplication of the same assessment measure under different criteria was rationalised. Finally, some criteria were determined to be important factors to consider for management but were not necessarily required for the assessment of a site’s significance.

#### 1.4.2 A new assessment system for Auckland

This alternative approach for Auckland is very similar to Myers (2011) and other assessment methods used nationwide (see Table 1). In fact, in 75% of cases the same or similar language was used in the Auckland system when compared with the Wildlands system (see Table 1). It does however, have a number of advantages that make it more applicable such as using less ambiguous terms. For example, Threat Status and Rarity replaces Rarity to reflect more accurately its purpose to identify species and ecosystems which are under threat or naturally rare and therefore worthy of scheduling. The term “threat status” is used worldwide as the basic term for the evaluation of the condition or state of species and ecosystems. It is used by the IUCN in its global Red Listing programme and by the Department of Conservation (NZ) in its regular assessments of the status of flora and fauna in New Zealand. Rarity meanwhile is not an accurate term to describe assets of conservation importance since not all rare species are threatened. In fact rarity itself is common with most species being rare (see de Lange and Norton 1998 and 1999). Furthermore, some attributes within Wildlands Rarity criterion were deemed not to be related to the rarity of a feature. For example, ‘indigenous species near its distributional limit’ or ‘type locality for an indigenous species’ are not necessarily uncommon elements of a regions biodiversity but they are unique and for that reason were moved to the new Uniqueness criterion. Therefore, the criterion Threat Status and Rarity has been used in this assessment system to replace Rarity.

Other criteria used by Myers (2011) were difficult to quantify such as Naturalness. As Norton and Roper-Lindsay (2004) stated “the concept of naturalness seems redundant when most New Zealand ecosystems have been affected to some extent by almost 800 years of direct human impacts. Furthermore, it would seem risky to equate low naturalness with low significance, as sites with exotic species can still be significant because of their potential to develop into ecosystems dominated by indigenous species, either because exotic species play a key role buffering or enhancing connectivity in remnant natural areas, or because they provide habitat for indigenous fauna”. In addition, the description of the naturalness criteria, which is defined as “the extent to which the natural area is still reflective of its original natural character and quality”, was interpreted as being of similar intent to the representative criteria. The Representative criteria states “...that is characteristic or typical of the natural ecosystem



diversity of the ecological district and/or Auckland” and it is assumed that it is from the natural ecosystem diversity that an area derives its natural character. For that reason Naturalness as a criterion was deleted from the Auckland Council approach.

The Habitat Values criterion meanwhile was also modified and moved. Its definition was “the extent to which an area provides an important habitat for species at different stages of their life cycle, e.g. breeding, spawning, roosting, feeding, and haul-out areas for the New Zealand fur seal. The area has habitat values, or provides or contributes to a habitat corridor or connection facilitating the movement of fish or wildlife species in the local area.”

The first part relating to the habitat of a representative species assemblage of a district was moved to the Representative criterion. The second part relating to habitat corridor and connectivity was moved to the Stepping Stones, Migration Pathways and Buffers criterion. This made the criterion of Habitat Values itself redundant.

Repetition in the Wildlands system was removed. For example, the Viability criterion included “Indigenous vegetation or habitat of indigenous fauna that is of sufficient size and shape or natural quality to maintain its ecological viability over time” and the Size and shape criterion included “Indigenous vegetation or habitat of indigenous fauna that is a relatively large example of its type within the relevant ecological district”. Although the first of these is a higher test, requiring long term viability, they are both repeating the need for size to be the determinant of significance.

The representative criterion has previously created significant problems in application. Some have argued that it should be applied only to the best sites of a district and to ecosystems already reduced to extreme scarcity in the landscape (Norton and Roper-Lindsay 2004). Others have suggested it should be applied to the maintenance of natural ecological processes and patterns in time and space, including typical and commonplace ecosystems, as well as the rare and threatened (Kelly and Park 1986). For that reason Kelly (1980) promoted the idea that at least 10% of the original area of each ecosystem type should be preserved. But there remains the issue of spatial scale, should the 10% rule apply nationwide or just within the Auckland region? And will that be enough to ensure the maintenance of biodiversity across a region?

Walker et al. (2008) stated that “maintenance of biological diversity requires protection of the long-term capacity of a landscape to support species populations. Survival of inherently dynamic ecosystems and their component species will not be achieved by preservation of a few isolated high quality sites, and elimination of less pristine (and more vulnerable) remaining ecosystems and truncation of remaining species meta-populations.” For that reason we provide a more inclusive representative criterion that sets a lower bar of 15% of the historic extent of each ecosystem. This is due to the increasing evidence of the importance of even small, degraded fragments to the overall maintenance of biological diversity across a landscape.

When evaluating the representativeness of a site it is important to do so within a spatial framework. That is the way the landscape is broken up into units for applying a significance assessment. Is a site representative at a global or national scale? Is it a representative of North Island or the Auckland Region or a representative of the natural ecosystem diversity of an ecological district? Most significance assessments used in New Zealand over the past 30 years have used ecological districts as a spatial framework. Although they are dated, having been

created in 1982 (McEwen 1982), they are one of the main ways ecologists spatially depict the New Zealand landscape. There is no quantitative replacement with as wide an acceptance as ecological districts. There are new emerging ways to spatially classify the landscape such as using the new Department of Conservation ecosystem classification system (Singers and Rogers 2012). For the purposes of the Unitary Plan, a site will be considered representative of both the region and an ecological district. This will ensure the region's fine scale ecological pattern and environmental gradients will be assessed appropriately as significant. There is potential to split the Rodney Ecological District into three different units (north hinterland, south hinterland and eastern coast) based on topography and development pressures in these different locations. This might be appropriate because it is such a large district when compared with the others.

The biggest departure from previous significance assessment methodologies is the decision not to include Viability as a primary criterion in this assessment system. A more detailed discussion about the exclusion of both Viability and Size and Shape (which duplicated aspects of Viability) is included in Section 4.1 (Viability) below. Many other significance assessment systems have used Size and Shape (see Table 1) but this was excluded from the Auckland approach. This is because it is most often defined as "the extent to which an area is of sufficient size and shape to maintain its intrinsic values". This duplicates aspects of Viability and is largely dependent on management as small sites that are degraded can be restored with sufficient effort. While it may be cheaper and more efficient to restore large sites that does not mean small sites are insignificant. In short, any site may be managed, protected or restored if there are sufficient funds or if there is landowner will or volunteer assistance to do so which means even quite degraded sites could be regarded as significant because they still have the potential to be restored.

New criteria were proposed, such as Uniqueness and distinctiveness, to cater for elements of the regions natural heritage that are endemic or unique (c.f., Rarity and Distinctiveness used by Norton and Roper-Lindsay 2004). Changes were also made where it was believed the measures did not accurately reflect the meaning of the criteria. For example, elements of the original Rarity criteria (such as endemic species or species near their distributional limits) were moved and included in Uniqueness and distinctiveness as they better reflected the meaning of that criterion.

Despite these changes, in many cases the site attributes of the criteria proposed by Wildlands (Myers 2011) were adopted fully or in a slightly modified way (see Table 1). This was because they were straightforward to apply and the language used was clear and concise. For example, where a threatened species population or threatened ecosystem is known to be present then it is possible to be confident of identifying a site as significant.

## 1.5 Other uses of significance criteria

Ecological significance criteria are used by Councils for purposes other than significance assessments to achieve Resource Management Act outcomes. These other uses include the prioritising of conservation management and parks acquisition. They may also be used to assess properties to determine if they qualify for additional subdivision entitlements. Not all significance criteria are equally important depending on the purpose for using them. For

example, in reserve acquisition assessments it is representativeness that is the primary criterion. This is because a protected area network should aim to protect a little bit of everything rather than a lot of just one type. When assessing entitlements to additional subdivision rights it may be inappropriate to use the presence of a threatened species as a criterion since additional restoration may adversely affect the threatened species e.g. planting forest around or near a rare shrubland plant which will ultimately out-compete it. This report outlines ecological significance criteria to be used in the identification of significant ecological areas for inclusion in Auckland Council's Unitary Plan.

## 1.6 Inclusivity

Auckland has suffered a major loss of indigenous vegetation and habitats for indigenous fauna. That means the thresholds for ecological significance may be lower. This approach is designed to be inclusive while at the same time transparent. It is not devised to protect every natural feature unless that is what is required to meet Council's function of maintaining biodiversity. That means it is essential to consider ecological significance not just of individual patches (of bush, dune or wetland) but at a landscape scale. This is so that vegetation or habitats which may not, on their own, meet any one significance criterion but do when assessed as a whole. In some areas, where loss of biodiversity has been extensive, most, and sometimes all, patches of habitats and vegetation are required for the maintenance of biodiversity (perhaps including the need for additional restored sites).

## 2 Approach

### 2.1 Inclusion / exclusion approach

In addition to revisiting the significance criteria, a series of inclusion and exclusion criteria have been developed. These are intended to assist in the assessment of significance. The inclusion criteria guide when a site meets a criterion. Conversely, the exclusion criteria guide when a site does not meet a criterion. If a site falls in the exclusion criteria for one criterion it can still meet the inclusion criteria for another criterion and therefore qualify as significant.

These inclusion / exclusion criteria are not exhaustive but are to be used as guides to assist with applying each significance criterion. Finally, they are not all required to be met to indicate significance. In fact, it is expected that there will be some redundancy in that not all criteria will be relevant to the evaluation of every place.

### 2.2 Methodology

For a natural area to be recommended for inclusion within the proposed Unitary Plan Significant Ecological Area schedule it must meet at least one of the five criteria (see Section 4). Care is required to avoid multiple counting of values to ensure that the value is directly related to the criterion being assessed.

In most cases it is impossible to measure all biodiversity at a single site. Nor is it possible to know all of the significant ecological sites in a region. Surrogates, such as vegetation type, have to be used to enable the assessments to be carried out.

## 3 Suggested new criteria

### 3.1 Representativeness

Representativeness ensures the full range of biodiversity (species, habitats and ecosystems) of the region is represented in the schedule to ensure that the expected or typical range of ecosystems naturally found in Auckland is maintained. This criterion ensures examples of common ecosystems are valued for their contribution to the maintenance of biodiversity. Ecological Districts have been used as the primary spatial scale that representativeness is assessed but a site can represent the typical vegetation or habitat type at a local or regional scale as well. In the future a defined ecosystem list for Auckland (in development) will ensure this measure can be more quantitatively assessed. Representative ecosystems can be small and modified areas including early successional stages but will meet this criterion if there is evidence that the site has potential to approximate an original type. It is intended that sites will be selected to reflect the full environmental representation of Auckland not just the largest.

#### Criteria for INCLUSION

- Is an example of an indigenous ecosystem (including both mature and successional stages) that makes up part of at least 10% of the natural extent<sup>1</sup> of each of Auckland's original ecosystem types<sup>2</sup> in each ecological district of Auckland (starting with the largest, most natural and intact, most geographically spread) and reflecting the environmental gradients of the region.

#### AND

- Is an example of an indigenous ecosystem (including both mature and successional stages), or habitat of indigenous fauna, that is characteristic or typical of the natural ecosystem diversity of the ecological district and/or Auckland **OR** is a habitat that is important to indigenous species of Auckland, either seasonally or permanently, including for migratory species and species at different stages of their life cycle (and including refuges from predation, or key habitat for feeding, breeding, spawning, roosting, resting, or haul out areas for marine mammals).

#### Criteria for EXCLUSION

- Is an ecosystem that is largely dominated by naturalised species (marram dune, pine forest) or indigenous species that are not native to Auckland (e.g., Kermadec pohutukawa forest).
- Few naturally occurring native species (for an ecosystem type where a higher diversity is expected) at the site because of pests, weeds, stock or other anthropogenic disturbance (e.g., treelands)
- Is an un-natural assemblage of native species (e.g., arboretum or plant nursery).

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<sup>1</sup> "Natural extent" is intended to mean a combination of our understanding of the historic pre-human diversity, distribution and extent of ecosystems in Auckland and what we would expect this to be given past and current environmental drivers.

<sup>2</sup> The Department of Conservation's ecosystem classification system described over 135 ecosystems in New Zealand (Singers and Rogers in press). Of these 35 ecosystems are known to have occurred in Auckland (see Table 2) and these are what is meant by original ecosystems. They include the more recent indigenous dominated shrub and scrublands that have evolved as a result of human modification of the landscape.

- Less than 20 years old and created by human management.
- Is an exotic dominated novel or synthetic ecosystem or exotic dominated ecosystem which exhibits conditions and combinations of organisms never before in existence.

## 3.2 Threat status and rarity

Threat status is an assessment of threat of extinction or decline. This applies to all levels of biodiversity e.g., genetics, species, communities, habitats and ecosystems, and at all spatial scales such as ecological district, local, region and nationwide. Biodiversity in Auckland is much reduced from its former extent. This criterion is included to ensure that any threatened biodiversity, some of which only occurs in the region, is protected. This also includes naturally rare biodiversity which is threatened by the fact that there is not much remaining. It also contributes to ensuring nationally threatened biodiversity is protected throughout its range. This criterion is more difficult to apply to marine ecosystems where, apart from marine mammals, there are no threat assessment systems. Where there are no formal systems to evaluate threat status expert judgment will be required.

### Criteria for INCLUSION

- Is an indigenous habitat, community or ecosystem that occurs naturally in Auckland and has been assessed by the Council (using the IUCN threat classification system) to be threatened based on evidence and expert advice (including Holdaway et al. In press. Status assessment of NZ naturally uncommon ecosystems)
- Is a habitat that supports occurrences of a plant, animal or fungi that has been assessed by the Department of Conservation and determined to have a national threatened conservation status (acutely or chronically) including Critical, Endangered, Vulnerable, Declining, Serious Decline, Gradual Decline and Recovering (see de Lange et al 2009) OR assessed by the Council to have a regional threatened conservation status including Regionally Critical, Endangered and Vulnerable and Serious and Gradual Decline (see Stanley et al. 2005)
- Is indigenous vegetation or habitat of indigenous fauna that occurs in Land Environments New Zealand Category IV where less than 20% remains
- Is any indigenous vegetation or habitat of indigenous fauna that occurs within an indigenous wetland or dune ecosystem
- Is a habitat that supports an occurrence of a plant, animal or fungi that is locally rare and has been assessed by the Department of Conservation and determined to have a national conservation status of Naturally Uncommon, Range Restricted or Relict

### Criteria for EXCLUSION

- Is a habitat that supports occurrences of an exotic plant, animal or fungi that is classified as threatened in its country of origin (e.g., bell frog)
- Common ecosystem types or habitats that support occurrences of common plants, animals or fungi

### Guidance Notes

Threat status and Rarity is only met with evidence from contextual work such as regional, national or international threat listings or expert knowledge where this is not available.

### 3.3 Diversity

Diversity (of species, habitats, communities and ecosystems) is a function of different drivers at different spatial scales and includes aspects such as competition between species, disturbance history, climatic variables, and landform (including drainage). Sites with high species diversity (or with the typical diversity for that habitat) or high ecosystem or habitat diversity are important as biodiversity hotspots. They are often larger sites, with more habitat heterogeneity, which can support more diversity.

They can also be small highly disturbed sites or sites which cross one or more gradients resulting in an ecological sequence. This criterion is used to assess the number and range of species at a site but also their assemblages in communities and ecological pattern.

#### Criteria for INCLUSION

- Is any indigenous vegetation that extends across at least one environmental gradient resulting in a sequence that supports more than one indigenous habitat, community or ecosystem type e.g., an indigenous estuary to an indigenous freshwater wetland
- Supports the expected ecosystem diversity for the habitat(s)
- Is a habitat type that supports a typical species richness or species assemblage for its type

#### Criteria for EXCLUSION

- Very low expected species and habitat diversity for its type (e.g., treeland)
- Only one ecosystem type or biological community is represented
- Less than 20 years old and created by human management
- Is indigenous vegetation that is largely dominated by naturalised species (marram dune, pine forest) or indigenous species not native to Auckland (e.g., Kermadec pohutukawa forest).

### 3.4 Stepping stones, migration pathways and buffers

The context of any site is critical for ecosystem function. It may be that some places are not significant on their own but only in context with other habitats or patches. A range of smaller or less significant sites, which together form an important vegetation component in the landscape, can have a cumulative significance much greater than that of the individual patches.

Some flora and fauna must move to different habitats for different stages of their life cycle. Many species will not expand in numbers unless their progeny can find new territories or sites. Many species will need to migrate to new sites to survive as the climate changes. Stepping stones or ecological corridors allow for the movement and maintenance of biodiversity. This may include migration pathways for marine and freshwater species such as long-fin eels or shark breeding sites.

#### Criteria for INCLUSION

- Is an example of an indigenous ecosystem, or habitat of indigenous fauna that is used by any native species permanently or intermittently for an essential\* part of their life cycle (e.g., known to facilitate the movement of indigenous species across the landscape) and therefore makes an important contribution to the resilience and ecological integrity of surrounding areas
- Is an example of an ecosystem, indigenous vegetation or habitat of indigenous fauna, that is immediately adjacent to, and provides protection for, indigenous biodiversity in an existing protected natural area (established for the purposes of biodiversity protection) or an area identified as significant under the 'threat status and rarity' or 'uniqueness' criteria. This includes areas of vegetation (that may be native or exotic) that buffer a known significant site. It does not include buffers to the buffers
- Is part of a network of sites that cumulatively provide important habitat for indigenous fauna or when aggregated make an important contribution to the provision of a particular ecosystem in the landscape
- Is a site which makes an important contribution to the resilience and ecological integrity of surrounding areas

#### Criteria for EXCLUSION

- Not used by native species either permanently or occasionally for an essential part of their life-cycle
- Site was used in the distant past and it unlikely to occur again (black stilts at Manukau for example, or *Astelia grandis* on Ponsonby Road) due to habitat transformation or species extinction or rarity
- Is indigenous vegetation or habitat of indigenous fauna that is not known to provide life supporting habitat or resources for essential for species survival at any time during the year
- Isolated with no physical connection to any other habitats and no known habitat use as an important stepping stone between other natural areas
- Less than 20 years old and created by human management

\*Where "essential" means the species does not live there all the time but needs the site to complete its life cycle, and there is a significant risk that loss or degradation of the site will affect the viability of the species in that area.



### 3.5 Uniqueness or distinctiveness

Auckland has several endemic plants, animals and ecosystems which only occur in the Auckland region, and are therefore the responsibility for their stewardship falls under the Council's mandate.

#### Criteria for INCLUSION

- Is habitat for a plant, animal or fungi that is endemic to the Auckland region (i.e., not found anywhere else)
- Is an indigenous ecosystem that is endemic to the Auckland region or supports ecological assemblages, structural forms or unusual combinations of species that are endemic to the Auckland region
- Is an indigenous ecosystem or a habitat that supports occurrences of a plant, animal or fungi that are near-endemic (i.e., where the only other occurrence(s) is within 100km of the council boundary)
- Is a habitat that supports occurrences of a plant, animal or fungi that is the type locality for that taxon
- Is noted for its importance as an intact sequence or outstanding condition in the region
- Is a habitat that supports occurrences of a plant, animal or fungi that is the largest specimen or largest population of the indigenous species in Auckland or New Zealand
- Is a habitat that supports occurrences of a plant, animal or fungi that are at (or near) their national distributional limit

#### Criteria for EXCLUSION

- Is an indigenous ecosystem or a habitat that supports occurrences of a plant, animal or fungi that are also found elsewhere in New Zealand
- Less than 20 years old and created by human management

## 4 Other factors to consider

There are a number of other factors that may be considered when assessing the significance of indigenous habitats. They are:

- The significance of the site to Tangata Whenua
- The long-term ecological viability of the site (that is the likelihood that the area will continue to exist); and
- The contribution of the habitat to the delivery of ecosystem services (directly or indirectly)
- The quality of the information about the site being assessed

### 4.1 Significance to Tangata Whenua

It is recognized that consideration of the significance of sites to maori is critical, and that this has not been addressed in the criteria set out here, which are focused purely on ecological significance. There may be information available on the significance of sites (being both sites identified through application of ecological significance criteria, or by mana whenua) that can be reflected in the Unitary Plan, however, a comprehensive approach to the identification of these sites still needs to occur.

### 4.2 Viability

We have chosen not to include viability as a primary criterion in this assessment system. This is the main difference between the Auckland council system and that prepared by Myers (2011). We do not think viability signifies significance, but only highlights the level of management required to protect the site in perpetuity. Any site may be managed, protected or restored if there are sufficient funds or if there is landowner will or volunteer assistance to do so. Instead there are a number of questions that may be asked about whether a site can be expected to remain intact with or without management. This may influence whether a site will be expected to exist into the future. If a site is not expected to exist for at least one human generation then we propose to give the site a qualifier of "Conservation Dependent" (CD) to indicate that its survival is not guaranteed without human action.

The long-term viability of natural areas has been used as a criterion for assessing significance for many years and was included in the original Protected Natural Area Programme work (Kelly and Park 1986; O'Connor *et al.* 1990). Some habitats are of such a size or configuration or location that they would be expected to retain a natural structure, composition and function over time in the absence

of, or with little or no, human intervention or management. Others may be protected through disproportionately lower levels of management (e.g., indigenous vegetation on pest free islands) and for that reason may be considered viable in the long term.

Norton and Roper-Lindsay (2004) suggested the use of a criterion called “Sustainability” which considers a site’s long-term viability, recognising the dynamic nature of ecosystems at a site. They promoted the use of a sustainability criterion where:

- key ecological processes remain viable or still influence the site; and
- the key ecosystems within the site are known to be or are likely to be resilient to existing or potential threats under some realistic level of management activity; and
- existing or potential land and water uses in the area around the site could be feasibly modified to protect ecological values.

Walker et al (2008) noted that the ‘sustainability’ qualifier of Norton and Roper-Lindsay (2004) implied it may be wasteful to protect sites which are unlikely to retain certain values in future. Sustainability as a significance criterion was subsequently rejected by the Environment Court in 2004.

### 4.3 Ecosystem services

Indigenous vegetation or habitats of indigenous fauna that contribute in a major way to the delivery of ecosystem services (directly or indirectly) may be considered significant. However, this has not been used as a criterion due to difficulties with quantifying the effect of a habitats or vegetation in providing ecosystem services.

This criterion may be very important in determining significance in marine ecosystems as healthy, non-polluted ecosystems in the sea are known to provide more services.

Instead, we propose that a qualifier of “Ecosystem Service Provider” (ESP) be given to sites that are known to deliver a significant ecosystem service that is compatible with the protection of biodiversity on site e.g. by providing food or fibre such as bee pollen for honey production, reducing nutrient leachate into streams or ground water, preventing erosion or by providing a community amenity. To be considered for the “Ecosystem Service Provider” qualifier the indigenous vegetation or habitat of indigenous fauna must:

1. Be providing an economic gain e.g. a tourism activity, honey production, pollination

2. Be preventing environmental damage such as erosion or sedimentation (e.g. all forest on category 8 land in Land Resource Inventory).

#### 4.4 Data deficient

In a perfect world, there would be complete knowledge about the current and historic spatial extent of Auckland's species and ecosystems. In reality, we have very little information about some natural heritage features. This may be because they are cryptic species or may have been overlooked, staff may have been unable to survey all sites or were unable to recognise them in the field.

In these instances, it is difficult to be accurate about any significance assessment. Therefore, we propose that a qualifier of "Data Deficient" (DD) be given to these sites. This qualifier may be applied to sites that are deemed significant, with the qualifier being used to indicate uncertainty about the rank. Alternatively, it could be used about non-significant sites where we believe additional survey work may be needed to achieve 100% certainty over the sites status. Note that a decision will need to be made about the inclusion or otherwise of these sites in the Unitary Plan with associated provisions.

## 5 Definitions

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**Table 1: Legacy and other council ecological assessment criteria**

Matters considered in significance testing	Auckland Council draft SNA criteria	Wildlands approach	Operative Auckland Regional Policy Statement 1999	Proposed Regional Policy Statement for the Wellington Region (Incorporating decisions on submissions May 2010)	Environment Bay of Plenty Operative Regional Policy Statement 2006	Proposed Canterbury Regional Policy Statement 2011	Auckland operative plans
<b>Representativeness</b>	<p>Is an example of an indigenous ecosystem (including both mature and successional stages) that contributes to the protection of at least 15% of the original extent of each ecosystem in Auckland starting with the largest areas first;</p> <p>AND</p> <p>Is an example of an indigenous ecosystem (including both mature and successional stages), or habitat of indigenous fauna, that is characteristic or typical of the natural ecosystem diversity of the ecological district and/or Auckland; or</p> <p>OR</p> <p>Is a habitat that is important to indigenous species of Auckland, either seasonally or permanently, including for migratory species and species at different stages of their life cycle (and including refuges from predation, or key habitat for feeding, breeding, spawning, roosting, resting, or haul out areas for marine mammals).</p>	<p>Indigenous vegetation, or indigenous ecosystem, or habitat of indigenous fauna that is representative, typical or characteristic of the natural diversity of an ecological district [including both mature and successional communities]; or</p> <p>Indigenous vegetation or habitat of indigenous fauna that is a representative example of the diversity of ecosystem types originally present in an ecological district; or</p> <p>Indigenous vegetation, ecosystem, or habitat of indigenous fauna considered to be one of the best or only examples of its type in an ecological district; or</p> <p>Indigenous vegetation or habitat of indigenous fauna that is or contains an ecosystem type that is underrepresented within the protected natural area network<sup>7</sup> of an ecological district;</p>	<p>The extent to which an area is representative or characteristic of the natural diversity in an ecological district. The area provides a characteristic example of the ecology of the local area. The area contains an unprotected ecosystem type, or an ecosystem type underrepresented within the protected area network of an ecological district.</p>	<p>High representativeness values are given to particular ecosystems and habitats that were once typical and commonplace in a district or in the region, and:</p> <p>(i) are no longer commonplace (<u>less than about 30% remaining</u>); or</p> <p>(ii) are poorly represented in existing protected areas (<u>less than about 20% legally protected</u>).</p>	<p>Indigenous vegetation or habitat of indigenous fauna contains associations of indigenous species representative, typical or characteristic of the natural diversity of the region or any relevant ecological district</p>	<p>Indigenous vegetation or habitat of indigenous fauna that is representative, typical or characteristic of the natural diversity of the relevant ecological district;</p> <p>Indigenous vegetation or habitat of indigenous fauna that is a relatively large example of its type within the relevant ecological district;</p> <p>Indigenous vegetation or habitat of indigenous fauna that is degraded but retains key natural ecosystem functions (for example hydrology or soil formation processes).</p>	<p>Franklin: The extent to which an area is representative or characteristic of the natural diversity in an ecological district or reflects important or representative aspects of New Zealand's geological history.</p> <p>Papakura: The extent to which the natural area is representative or characteristic of the natural diversity in an ecological district or contains outstanding or rare indigenous community types nationally.</p>



Matters considered in significance testing	Auckland Council draft SNA criteria	Wildlands approach	Operative Auckland Regional Policy Statement 1999	Proposed Regional Policy Statement for the Wellington Region (Incorporating decisions on submissions May 2010)	Environment Bay of Plenty Operative Regional Policy Statement 2006	Proposed Canterbury Regional Policy Statement 2011	Auckland operative plans
							Waitakere: It is the best, or one of the best, representative site(s) of an indigenous vegetation community within its ecological district.
Naturalness	See other criteria such as Diversity and Representativeness	Indigenous vegetation that is of relatively natural or intact state for the relevant ecological district, and would be self sustaining with low levels of management;	The extent to which an area is still reflective of its original natural character and quality.	Not included	Indigenous vegetation or habitat of indigenous fauna is in a natural state or healthy condition, or is in an original condition;	Indigenous vegetation that is in a relatively intact state for the relevant ecological district i.e. has relatively little human modification.	Franklin: The natural diversity of species of flora and fauna, biological communities and ecosystems, geological or edaphic features such as landforms and land processes, parent material, and records of past processes; AND The extent to which an area is still reflective of its original natural character and quality.  Papakura: The extent to

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							<p>which the natural area is still reflective of its original natural character and quality.</p> <p>Waitakere: It is a vegetation community in an original condition, or is in a largely natural state or healthy condition.</p> <p>Auckland City: The naturalness of the area when compared to similar ecosystems within the relevant ecological district or environmental domain;</p>
<b>Diversity</b>	Is any habitat or indigenous vegetation that extends across at least one environmental gradient resulting in a sequence that supports more than one indigenous habitat, community or ecosystem type e.g., an estuary to a freshwater wetland; or Supports the expected ecosystem diversity for the	Indigenous vegetation or habitat of indigenous fauna that contains a high diversity of indigenous species, or indigenous ecosystems or habitat types, or biological communities; or Indigenous vegetation or habitat of indigenous fauna that contains or forms part of an ecological sequence <sup>8</sup> , or an ecotone <sup>9</sup> , or	The natural diversity of species of flora and fauna, biological communities and ecosystems, geological or edaphic features such as landforms and land processes, parent material, and records of past processes. The diversity of ecological	The ecosystem or habitat has a natural diversity of ecological units, ecosystems, species and physical features within an area.	Indigenous vegetation or habitat of indigenous fauna contains a high diversity of indigenous ecosystem or habitat types, or changes in species composition, reflecting the existence of diverse natural features (for example landforms, soil types or	Indigenous vegetation or habitat of indigenous fauna that contains a high diversity of indigenous ecosystem or habitat types, indigenous species, or genotypes, or has changes in species composition reflecting the	Franklin: The diversity of ecological patterns, such as the change in species composition or communities along environmental gradients.

Matters considered in significance testing	Auckland Council draft SNA criteria	Wildlands approach	Operative Auckland Regional Policy Statement 1999	Proposed Regional Policy Statement for the Wellington Region (Incorporating decisions on submissions May 2010)	Environment Bay of Plenty Operative Regional Policy Statement 2006	Proposed Canterbury Regional Policy Statement 2011	Auckland operative plans
	<p>habitat(s); or Is a habitat type that supports a typical species richness or species assemblage for its type; or Contributes to diverse ecological patterns in the landscape</p>	<p>contains a diversity of ecological pattern such as the change in species composition or communities along environmental or ecological gradients;</p>	<p>pattern, such as the change in species composition or communities along environmental gradients.</p>		<p>hydrology), or communities along an ecological gradient;</p>	<p>existence of diverse natural features or ecological gradients.</p>	<p>Papakura: The diversity of ecological patterns within the natural area, such as the change in species composition or communities along environmental gradients.</p> <p>Waitakere: It contains a high diversity of native plant species for its vegetation community type AND it contains a high diversity of ecological pattern, for example a change in species composition or vegetation communities along an environmental gradient AND it has adequate buffering or protection from external effects, or has the</p>

Matters considered in significance testing	Auckland Council draft SNA criteria	Wildlands approach	Operative Auckland Regional Policy Statement 1999	Proposed Regional Policy Statement for the Wellington Region (Incorporating decisions on submissions May 2010)	Environment Bay of Plenty Operative Regional Policy Statement 2006	Proposed Canterbury Regional Policy Statement 2011	Auckland operative plans
							<p>potential for buffer areas to be added in the future AND it is linked or can be linked to other protected natural areas (i.e. presence or establishment of ecological corridors).</p> <p>Auckland City: The natural diversity of species, natural communities and ecosystems, including diversity along environmental gradients.</p>
<b>Rarity</b>	<p>Threat Status and Rarity: Is an indigenous habitat, community or ecosystem that occurs naturally in Auckland and has been assessed by the Council (using the IUCN threat classification system) to be threatened based on evidence and expert advice (including Holdaway et al 2012 – Threat status of uncommon ecosystems of NZ); or Is a habitat (including seasonal</p>	<p>Indigenous vegetation or habitat of indigenous fauna that has been reduced to less than 20% of its former extent in the Region, or relevant land environment<sup>10</sup>, or ecological district<sup>11</sup>; or Indigenous vegetation or habitat of indigenous fauna that supports, or contributes to the recovery of, an indigenous species that is nationally or regionally threatened, at risk, or uncommon nationally or</p>	<p>The presence of a threatened species or uncommon, special or distinctive features. The area contains a Regionally threatened species or a unique or special feature.</p>	<p>The ecosystem or habitat has biological physical features that are scarce or threatened in a local, regional or national context. This can include individual species, rare and distinctive biological communities and physical features that are unusual or rare.</p>	<p>Indigenous vegetation or habitat of indigenous fauna supports an indigenous species or associations of indigenous species threatened or are nationally, regionally or within the relevant ecological district; Indigenous vegetation or habitat of indigenous fauna can contribute to</p>	<p>Indigenous vegetation or habitat of indigenous fauna that has been reduced to less than 20% of its former extent in the Region, or relevant land environment, ecological district, or freshwater environment; Indigenous vegetation or habitat of</p>	<p>Franklin: The presence of a threatened species, or the feature's rarity, or uncommon, special or distinctive features.</p> <p>Papakura: The presence of a threatened</p>

Matters considered in significance testing	Auckland Council draft SNA criteria	Wildlands approach	Operative Auckland Regional Policy Statement 1999	Proposed Regional Policy Statement for the Wellington Region (Incorporating decisions on submissions May 2010)	Environment Bay of Plenty Operative Regional Policy Statement 2006	Proposed Canterbury Regional Policy Statement 2011	Auckland operative plans
	<p>and core) that supports occurrences of a plant, animal or fungi that has been assessed by the Department of Conservation and determined to have a national threatened conservation status (acutely or chronically) including Critical, Endangered, Vulnerable, Declining, Serious Decline, Gradual Decline (see Miskelly et al 2008, de Lange et al 2009) OR assessed by the Council to have a regional threatened conservation status (see Stanley et al. 2005); or</p> <p>Is indigenous vegetation or habitat of indigenous fauna that occurs in Land Environments New Zealand Category IV where less than 20% remains; or</p> <p>Is an example of an indigenous ecosystem, or habitat of indigenous fauna, that is poorly protected in New Zealand's and/or Auckland's Protected Natural Area Network and/or marine protected area network; or</p> <p>Is a habitat that supports occurrences of a plant, animal or fungi that are locally rare or has been assessed by the Department of Conservation and determined to have a national conservation status of Naturally Uncommon or Range Restricted. See also Uniqueness and</p>	<p>regionally; or</p> <p>Habitat that contains indigenous species or subspecies or variety endemic to the Auckland region; or an indigenous species near its distributional limit; or is the type locality for an indigenous species; or</p> <p>Indigenous vegetation or habitat of indigenous fauna that contains an association of indigenous species, or an indigenous community, or indigenous ecosystem that is distinctive, uncommon, of restricted occurrence nationally or regionally, or in an ecological district; or</p> <p>Indigenous vegetation or habitat of indigenous fauna that is or contains a naturally uncommon ecosystem type at a national<sup>12</sup> or regional<sup>13</sup> level; or</p> <p>Indigenous vegetation or habitat of indigenous fauna associated with a wetland; or</p> <p>Indigenous vegetation or habitat of indigenous fauna associated with sand dunes;</p>			<p>the maintenance or recovery of a species threatened or rare nationally, regionally or within the relevant ecological district; Indigenous vegetation or habitat of indigenous fauna is distinctive, of restricted occurrence, or at the limits of its natural distribution range, or has developed as a result of factors such as natural geothermal activity, historical cultural practices, altitude, water table, or soil type; Indigenous vegetation or habitat of indigenous fauna is significantly reduced in area and is degraded but retains key natural ecosystem functions (for example hydrology) and has high potential for restoration.</p>	<p>indigenous fauna that supports an indigenous species that is threatened, at risk, or uncommon, nationally or within the relevant ecological district; The site contains indigenous vegetation or an indigenous species at its distributional limit within the Canterbury region or nationally; Indigenous vegetation or an association of indigenous species that is distinctive, of restricted occurrence, occurs within an originally rare ecosystem, or has developed as a result of an unusual environmental factor or combination of factors.</p>	<p>species as listed by published Department of Conservation reports or uncommon, special or distinctive features listed by published Department of Conservation or Auckland Regional Council reports.</p> <p>Waitakere: It is a threatened vegetation community within its ecological district or contains populations of threatened species AND it is an indigenous vegetation community type poorly represented in the City's protected area network AND it is threatened in the short-term with loss or destruction, or</p>

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	distinctiveness						<p>significant degradation in condition or health.</p> <p>Auckland City: The degree to which there has been cumulative loss of the extent and species diversity of this type of ecosystem from the prehuman state within the ecological district or environmental domain AND the rarity of the ecosystem or community AND the presence of threatened species.</p>
<b>Size and shape</b>	Not included – see Uniqueness and distinctiveness and Representativeness (under this criterion sites will be selected preferentially based on size to reach a 15% threshold for each ecosystem type).	Indigenous vegetation or habitat of indigenous fauna that is a relatively large example of its type within the relevant ecological district;	The extent to which an area is of sufficient size and shape to maintain its intrinsic values.	Not included	Indigenous vegetation or habitat of indigenous fauna is one of the largest remaining examples of its type within the region or any relevant ecological district.	Not included	<p>Franklin: The extent to which an area is of sufficient size and shape to maintain its intrinsic value.</p> <p>Papakura: The natural area</p>

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							<p>must be at least 0.5ha in size, consisting of at least 75% indigenous vegetation canopy cover (for terrestrial ecosystems).</p> <p>Auckland City: The extent to which an area is of sufficient size to maintain its intrinsic values.</p>
<b>Intactness /viability</b>	<p>Not included – Viability is largely dependent on management as small sites that are degraded can be restored with sufficient effort. While it may be cheaper and more efficient to restore large sites that does not mean small sites are insignificant.</p> <p>See also Diversity</p>	<p>Indigenous vegetation or habitat of indigenous fauna that is sufficiently buffered and protected from the impact of external effects to maintain its intrinsic values and ecological viability; or</p> <p>Indigenous vegetation or habitat of indigenous fauna that is of sufficient size and shape or natural quality to maintain its ecological viability over time;</p>	<p>The extent to which a natural area can maintain its ecological viability over time. The area is of good quality (e.g. for natural areas it has an intact understorey and is characterised by a low level of invasion from pest species).</p>	Not included	<p>Indigenous vegetation or habitat of indigenous fauna is of sufficient size and compact shape and has the capacity to maintain its ecological viability over time;</p> <p>Indigenous vegetation or habitat of indigenous fauna supports intact habitats and healthy functioning ecosystems;</p> <p>Indigenous vegetation or habitat of indigenous fauna is of sufficient size and compact shape to resist changes initiated by external agents.</p>	Not included	<p>Franklin: The extent to which a natural area can maintain its ecological viability over time.</p> <p>Papakura: The extent to which the natural area can maintain its ecological viability over time AND The extent to which the natural area is of sufficient size and shape to maintain</p>

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							<p>its intrinsic values AND the extent of management required to maintain the natural area to a point where it is largely self-sustaining.</p> <p>Waitakere: It will maintain or has the potential to maintain its ecological viability through its size, shape and health.</p>
<b>Naturally Rare Ecosystems</b>	See Rarity		The presence of uncommon, special or distinctive features.	Not included	Not included	Not included	
<b>Ecological Context</b>	<p>Stepping stones, migration pathways and buffers:</p> <p>Is an example of an indigenous ecosystem, or habitat of indigenous fauna that is used by any native species permanently or intermittently for an essential part of their life cycle e.g., known to facilitate the movement of indigenous species across the landscape; or</p> <p>Is an example of an ecosystem, or habitat of indigenous fauna, that is immediately adjacent to,</p>	<p>Vegetation or habitat of indigenous fauna that provides or contributes to an ecological corridor, connection or stepping stone, facilitating the movement of indigenous species across the landscape; or</p> <p>Vegetation or habitat of indigenous fauna that provides or is a component of a buffer to a significant natural resource or indigenous ecosystem</p>	The relationship a natural feature has with its surrounding landscapes, including its role as an ecological corridor or riparian margin, and the extent of buffering or protection from external adverse effects. The area contributes to the ecological viability of surrounding areas and biological communities. The area is a component	Ecological context of an area: the ecosystem or habitat: (i) enhances connectivity or otherwise buffers representative, rare or diverse indigenous ecosystems and habitats; or (ii) provides seasonal or core habitat for <u>protected</u> or <u>threatened</u> indigenous species.	Indigenous vegetation or habitat of indigenous fauna contributes to the ecological viability of adjoining natural areas and biological communities, by providing or contributing to an important linkage or network, or providing a buffer from adjacent land uses; Indigenous vegetation or habitat of indigenous fauna provides habitat	Vegetation or habitat of indigenous fauna that provides or contributes to an important ecological linkage or network, or provides an important buffering function. A wetland which plays an important hydrological, biological role in the natural functioning of river or coastal system.	<p>Franklin: The relationship a natural feature has with its surrounding landscape, and the extent of buffering or protection from external adverse effects.</p> <p>Papakura: The relationship of the natural</p>



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	and provides protection for, an existing protected natural area, or area identified as significant under the 'threat status and rarity' or 'uniqueness' criteria; or Is a site which contributes to the resilience and ecological integrity of surrounding areas.		of, adjoins or provides a buffer to, a significant natural resources, or a watercourse or coastal margin. The area is in a landscape which is depleted of indigenous vegetation. The protection of the area adds significantly to the spatial characteristics of the protected area network (e.g. by improving connectivity or reducing distance to the next protected area).		for indigenous species at key stages of their life cycle.	Indigenous vegetation or habitat of indigenous fauna that provides important habitat (including refuges from predation, or key habitat for feeding, breeding, or resting for indigenous species, either seasonally or permanently.	area with its surrounding landscape, including its role as an ecological corridor or riparian margin, and the extent of buffering or protection from external adverse effects.  Auckland City: The importance of the area for assisting the movement of indigenous species.
<b>Habitat values</b>	See Representativeness	Indigenous vegetation or habitat of indigenous fauna that provides an important habitat for indigenous species, either seasonally or permanently, including for migratory species and species at different stages of their life cycle (and including refuges from predation, or key habitat for feeding, breeding, spawning, roosting, resting, or haul out areas for marine mammals);	The extent to which an area provides an important habitat for species at different stages of their life cycle, e.g. breeding, spawning, roosting, feeding, and haul-out areas for the New Zealand fur seal. The area has habitat values, or provides or contributes to a habitat corridor or connection facilitating the movement of fish or	Not included	Not included	Not included	Franklin: The extent to which an area provides an important habitat for species at different stages of their life cycle.  Papakura: The extent to which the natural area provides an important habitat for indigenous

Matters considered in significance testing	Auckland Council draft SNA criteria	Wildlands approach	Operative Auckland Regional Policy Statement 1999	Proposed Regional Policy Statement for the Wellington Region (Incorporating decisions on submissions May 2010)	Environment Bay of Plenty Operative Regional Policy Statement 2006	Proposed Canterbury Regional Policy Statement 2011	Auckland operative plans
			wildlife species in the local area.				<p>species at different stages of their life cycle, (e.g., wader bird breeding, fish spawning).</p> <p>Waitakere: It contains a significant population of indigenous species.</p> <p>Auckland City: The importance of the area to indigenous fauna.</p>
<b>Wetland Specific Criteria</b>	See Rarity		Not included	Not included	Not included	Not included	<p>Manukau: The wetland has characteristics of representativeness or particular habitat types and/or has value because of its uniqueness, location or size; The wetland has habitat values which support species diversity (including genetic diversity), populations, community</p>

Matters considered in significance testing	Auckland Council draft SNA criteria	Wildlands approach	Operative Auckland Regional Policy Statement 1999	Proposed Regional Policy Statement for the Wellington Region (Incorporating decisions on submissions May 2010)	Environment Bay of Plenty Operative Regional Policy Statement 2006	Proposed Canterbury Regional Policy Statement 2011	Auckland operative plans
							<p>associations, or threatened species of plants and animals;  The wetland is vulnerable to destruction or modification.  Scientific / Education / Cultural Importance / Amenity Values  The wetland is known to be of particular significance to tangata whenua and their cultural values;  The wetland is of educational, scientific or passive recreational value;  The wetland has landscape value or visual appeal.</p> <p>Auckland City:  The importance of the area for maintaining water quality in freshwater and saline</p>

Matters considered in significance testing	Auckland Council draft SNA criteria	Wildlands approach	Operative Auckland Regional Policy Statement 1999	Proposed Regional Policy Statement for the Wellington Region (Incorporating decisions on submissions May 2010)	Environment Bay of Plenty Operative Regional Policy Statement 2006	Proposed Canterbury Regional Policy Statement 2011	Auckland operative plans
							environments AND the importance of the area for maintaining the biodiversity values of adjacent freshwater or saline environments.
<b>Uniqueness and distinctiveness</b>	<p>Is a habitat that is critical habitat for a plant, animal or fungi that is endemic to the Auckland region (i.e., not found anywhere else); or</p> <p>Is an indigenous ecosystem that is endemic to the Auckland region or supports ecological assemblages, structural forms or unusual combinations of species that are endemic to the Auckland region; or</p> <p>Is an indigenous ecosystem or a habitat that supports occurrences of a plant, animal or fungi that are near-endemic (i.e., where the only other occurrence(s) is within 100km of the council boundary)</p> <p>Is a habitat that supports occurrences of a plant, animal or fungi that is the type locality for that taxon; or</p> <p>Is noted for its importance as an intact sequence or outstanding condition in the region; or</p>	Addressed through rarity and other criteria	Addressed through rarity and other criteria	Addressed through rarity and other criteria	Addressed through rarity and other criteria	Addressed through rarity and other criteria	<p>Auckland City: The presence of species at their distributional limits;</p> <p>Also addressed through rarity and other criteria</p>

Matters considered in significance testing	Auckland Council draft SNA criteria	Wildlands approach	Operative Auckland Regional Policy Statement 1999	Proposed Regional Policy Statement for the Wellington Region (Incorporating decisions on submissions May 2010)	Environment Bay of Plenty Operative Regional Policy Statement 2006	Proposed Canterbury Regional Policy Statement 2011	Auckland operative plans
	<p>Is a habitat that supports occurrences of a plant, animal or fungi that is the largest specimen or largest population of the species in Auckland or New Zealand; or</p> <p>Is a habitat that supports occurrences of a plant, animal or fungi that are at (or near) their national distributional limit.</p>						
<b>Tangata Whenua and other</b>	Not included	<p>Indigenous vegetation or a habitat of indigenous fauna identified by and important to Tangata Whenua; or</p> <p>Indigenous vegetation or habitat of indigenous fauna where there is a community association or public appreciation of the aesthetic values of the area, or where significant community effort is supporting the maintenance and restoration of indigenous biodiversity.</p>	<p>The importance of an area to Tangata Whenua. There is a community association with, or public appreciation of, the aesthetic values of the landform or feature.</p>	<p>The ecosystem or habitat contains characteristics of special spiritual, historical or cultural significance to tangata whenua, identified in accordance with tikanga Maori.</p>	<p>Indigenous vegetation or habitat of indigenous fauna contributes to the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu and other taonga;</p> <p>Indigenous vegetation or habitat of indigenous fauna is known and valued for its connection to the history of the place;</p> <p>Indigenous vegetation or habitat of indigenous fauna is known and valued by the immediate and wider community for its contribution to sense of place leading to community association with or public esteem for the place, or due to its value for recreation</p>	Not included	<p>Franklin: The importance of an area to Tangata Whenua.</p> <p>Papakura: The actual or potential threats that the natural area may be exposed to and the vulnerability of an area to threats or other influences AND the level of community (including tangata whenua) association with or restoration effort in the natural area.</p> <p>Waitakere: It is a site which</p>

Matters considered in significance testing	Auckland Council draft SNA criteria	Wildlands approach	Operative Auckland Regional Policy Statement 1999	Proposed Regional Policy Statement for the Wellington Region (Incorporating decisions on submissions May 2010)	Environment Bay of Plenty Operative Regional Policy Statement 2006	Proposed Canterbury Regional Policy Statement 2011	Auckland operative plans
					or education.		has the potential for restoration of a threatened indigenous vegetation community.

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**Table 2: Auckland indigenous ecosystems - based on Singers and Rogers (in press)**

Ecosystem name and unit code	Ecosystem Description	Distribution (both current and historic) with examples and comments	References	Comments and Queries
Pohutukawa, puriri, karaka broadleaved forest, WF5	Broadleaved forest of at least two variants; i.) abundant pohutukawa and ii.) pohutukawa, puriri, karaka, kohekohe locally with titoki, mangeao, rewarewa, tawa, puka, tawapo, ngaio, nikau and taraire, kauri, kowhai, tanekaha in northern range and locally hard beech along the Bay of Plenty coast and East Cape (also with black beech). Often with kanuka on dry, steep ridges. Where present on some northern off-shore Islands, especially Three Kings includes local endemic species and varieties.	Predominantly frost-free areas from Three Kings, then Te Pahi south to Mahia and New Plymouth, with inland outliers occurring around some Central North Island lakes. Southern boundary conforms to the southern limits of puriri aligning approximately to the thermic soil temperature zone Molloy, 1998 pp. 209. Younger successional variants occur on recent lava flows and volcanic surfaces, e.g. Rangitoto Island.	Equivalent to B1 & P1-P3 & O1 & O2 types of Nicholls (1976) and type e of Ecroyd (1982). Bayfield et al. (1991), Conning (2001), Whaley et al. (2001). Includes rare ecosystem: Recent lava flows (<1000 years) (Williams et al. 2007).	Present in Auckland. Includes areas known as lava forest, such as found on Mt Eden, through to forest on Rangitoto. Scrub is picked up by FI types.
Totara broadleaved forest, WF6	Podocarp, broadleaved forest of mosaics of kanuka on younger (Holocene) dunes, grading into titoki, totara, mahoe, karaka, kohekohe, tawa, puriri, hinau and locally pohutukawa, narrow leaved maire and taraire on older dunes.	Northern dunelands from North Cape to Kawhia, Coromandel, Matakana Island and Bay of Plenty Coast to East Cape e.g., Pretty and Tapu Bush. Parent material mapped for Northland in Molloy, 1998 pp. 84. Very rare and threatened predominantly largely only secondary derivatives remain of kanuka dominant forest (Smale 1994). Now very rare and fragmented.	Not covered by Nicholls, (1976). Smale et al. (1996), Ogle (1997), Conning (2001). Includes rare ecosystem: Stable sand dunes (Williams et al. 2007).	Present in Auckland e.g. Woodhill forest.

Puriri forest, WF8	Broadleaved forest of abundant puriri of several variants determined by landform and soil type with i.) occasional totara, matai, kahikatea and titoki locally with kowhai and taraire on alluvial free draining soils and ii.) occasional taraire, totara, matai, pukatea, rewarewa, karaka, kohekohe, tawa, titoki, Northern rata and abundant nikau on fertile basaltic volcanic loam soils. iii.) occasional kahikatea, kohekohe and nikau on recent fluvial (silt) soils.	Predominantly frost-free and fertile recent soils on alluvial terraces and recent basaltic areas. Variant ii.) occurs on melanic granular soils e.g. Papakauri soil in three main areas of occurrence, Pukekohe-Auckland, Whangarei and Kerikeri-Kaikohe, mapped in Molloy 1998 pp. 84. Youngest basaltic examples (occurring on more recent basaltic lava flows in the Auckland volcanic field) are colloquially described as "lava forests" (Lindsay, et al. 2009). Largely only secondary/ modified derivatives of kanuka and scattered totara, puriri, taraire now remain. Variant iii.) recent fluvial (silt) soils especially on the East Coast e.g. Greys Bush near Gisborne. Now very rare and fragmented.	Wardle (1991 pp.120). Tyrell et al. (1999 pp. 53-53). Conning (2001).	Present in Auckland. Auckland examples potentially contain more taraire than just occasional that is indicated in the description.
Kahikatea, pukatea forest, WF9	Podocarp, broadleaved forest of abundant kahikatea with occasional to abundant pukatea, kiekie, supplejack and locally rimu, tawa and swamp maire particularly on organic and gley soils with a high water table.	Predominantly west of the divide on poor draining alluvial, organic and gley soils in warm to mild, humid to sub-humid areas of the North Island, from Northland to Wellington e.g. Western Egmont National Park and also localised areas in Nelson and Blenheim. East of the divide in semi arid regions restricted small areas in permanent wet depressions, e.g. lake margins.	Equivalent to L1 type of Nicholls (1976). Smale (1984), Clarkson (1986), Clarkson et al. (1986). Bayfield et al. (1991 p. 153). Ravine (1991). Connin(2001 ).	Present in auckland



Rimu, taraire, tawa forest, WF10	Podocarp, broadleaved forest of abundant taraire with occasional rimu, miro, Northern rata, tawa, kohekohe, occasional hinau, rewarewa, pukatea and locally puriri and towai (though absent from the Auckland region)	Occurs in predominantly frost-free areas where kauri is absent (predominantly eastern) from lower Waikato District northwards and throughout Northland below 450m alt. Also found on Great Barrier Island.	Equivalent to E1-E3 types of Nicholls (1976). McKelvey and Nicholls 1959. Barton (1972).	Present in Auckland
Kauri forest, WF11	Kauri forest with occasional podocarp (miro, rimu, toatoa, Hall's totara, tanekaha) and broadleaved trees (rata, tawa, taraire, hinau, rewarewa, kohekohe and towai)	Predominantly frost free areas now largely restricted to western Auckland to Northland hill country e.g. Warawara, Waipoua Forests and small patches within the Waitakere and Coromandel Ranges. Also present in warm humid areas. Kauri are predominantly tall with a large basal area, while podocarp and broadleaved trees are generally stunted.	Equivalent to A1/A2 types of Nicholls (1976) and types a/b of Ecroyd (1982), Wardle (1991 pp.117), Burns and Leathwick (1996), Conning (2001).	Present in Auckland, though mostly logged
Kauri, podocarp, broadleaved forest, WF12	Kauri, podocarp, broadleaved forest with occasional rimu, miro, kahikatea, kauri, taraire, tawa, towai, kohekohe, puriri, rewarewa. Altitude variants occur with taraire more abundant at lower altitude while towai at higher altitudes.	Predominantly frost free areas north of Hamilton and Tauranga including Puketi-Omahuta, Waitakere, Hunua and Coromandel and Northern Kaimai Ranges. Commonly a secondary derivative of kauri forest.	Equivalent to B2-B9 types of Nicholls (1976) and type f of Ecroyd (1982), Wardle (1991 pp.117-119), Conning (2001).	Present in Auckland. May want to combine this one with WF11 for purposes of managing them.
Kauri, podocarp, broadleaved, beech forest, WF13	Kauri, podocarp, broadleaved and hard beech forest with occasional tanekaha, Hall's totara/ lowland totara, rimu, miro, tawa, hinau, rewarewa and locally narrow leaved maire, tawari and hard beech - generally confined to ridges.	Predominantly frost free eastern areas south of Auckland from Hunua Ranges to Hapuakohe Ecological District and Mt. Taupiri (Waikato Region), Coromandel range. Now rare in Northland predominantly restricted to eastern drier sites. Also on Hauraki gulf Islands e.g. Little Barrier Island. Most areas are largely secondary/ modified derivatives following fire and logging. Also present in humid areas. Hard beech	Equivalent to C1-C4 types of Nicholls (1976), type d of Ecroyd (1982) and (h) type of Wardle (1984). Wardle (1991) pp.117. Collins and Burns (2001).	Present in Auckland

Tawa, kohekohe, mangeao broadleaved podocarp forest, WF14	Podocarp, broadleaved forest of occasional emergent rimu, miro, Northern rata and locally kahikatea with abundant tawa, kohekohe, hinau, rewarewa and pukatea. Locally includes tawari, kamahi, towai, puriri and mangeao, though towai and mangeao are locally absent or rare (e.g. Auckland and East Cape).	Inland hill country and higher ground in Northland, Hunua and Coromandel where Kauri is absent. More widespread in Waikato and Bay of Plenty, with southern limits at approximately New Plymouth and Mahia.	Equivalent to D1-D9+D12 types of Nicholls (1976) and alliance 23 of Wiser et al. (2011). Equivalent to Barton (1972).	Present in Auckland though lacking towai and mangeao.
Kahikatea forest, MF2	Podocarp forest of abundant kahikatea locally with matai and a sparse sub-canopy of ribbonwood, hoheria, locally kowhai, pokaka, mahoe, lemonwood and divaricating shrubs on alluvial Holocene flood plains. Ribbonwood and hoheria locally absent while often is pokaka more abundant.	Predominantly eastern North and South Islands, though including Northland, Waikato and Manawatu. In South island to approximately Omaru.	Equivalent to L1 type of Nicholls (1976). Maxwell et al. (1993), Moore (1999 e.g. RAP 19, p. 144), Whaley et al. (2001 .g. RAP TIN 30, pp.118), McGlone (2001).	
Tawa, <i>Weinmannia</i> podocarp forest, MF4	Podocarp, broadleaved forest of abundant tawa and <i>Weinmannia</i> of at least four local variants, i.) Northland with scattered emergent rimu, Northern rata and miro, abundant towai occasional tawa, tawari, hinau and locally hutu. ii.) Waikato/Bay of Plenty with occasional emergent rimu, miro, kahikatea, matai, totara, Northern rata and abundant tawa, kamahi, occasional mangeao, hinau, rewarewa, and locally pukatea and iii.) Central, Eastern and Southern with emergent rimu, miro, kahikatea, matai, totara, Northern rata and abundant tawa, kamahi, hinau, rewarewa, and pukatea (and locally tawari in North of range on non-volcanic soils). iv.) Taranaki with scattered emergent rimu, kahikatea, Northern rata, abundant tawa, pukatea and mahoe and locally kamahi, miro and hinau.	Downland and hill country predominantly inland; Variant i.) locally above 450m on the Northland, Hunua and Coromandel ranges, Variant ii.) inland Waikato, Bay of Plenty, King Country, Variant iii.) Northern and Southern Urewera ranges, western Raukumara, Wanganui, western margin of the Tararua range. Also east of the main divide on higher country, particularly in the Tiniroto E.D and Tararua District in humid locations. Small areas occur in the Marlborough Sounds. Variant iv.) Taranaki volcanic ringplain, South Taranaki downlands.	Equivalent to D6-D8, D10-D16, M1-M5, G1-G6 types of Nicholls (1976) and ND1 types of McKelvey (1984) and alliance 21 & 22 of Wiser et al. (2011). Barton (1972).	Present in Auckland e.g. upper zone of Hunua, though composition degraded by possum impacts see Barton 1972

Towai, rata, montane podocarp forest, MF22	Kauri, podocarp, broadleaved low forest of kauri, yellow-silver pine, rimu, Kirk's pine, toatoa and locally Hall's totara, tawari, hinau, towai, Southern and Parkinson's rata and quintinia.	From summits of Northern Kaimai Range - Coromandel e.g. Mt. Moehau, Little Barrier Island, >600m on Little Barrier Island, Mt. Hobson, Great Barrier Island	Equivalent to B10-B12 and G7 types of Nicholls (1976), type g of Ecroyd (1982). Conning (2001). Locally includes rare ecosystems: Seabird burrowed soil e.g. Hauturu and Cloud forest (Williams et al. 2007).	Present in Auckland e.g. Hauturu, and Mt.Hobson (GBI)
Manuka, mingimingi, <i>Baumea</i> scrub/sedgeland [Gumland], WL1	Low scrub, sedgeland of two broad types (poor draining and seasonally dry), dominated by manuka with mingimingi with species of <i>Baumea</i> , <i>Schoenus</i> , <i>Gahnia</i> , <i>Tetraria</i> and <i>Lepidosperma</i> sedges, tangle fern and locally <i>Epacris</i> and <i>Dracophyllum</i>	Palustrine wetlands in Northland and Auckland regions, developed in association with historic kauri forest podzolised soils Wharekohe and Te Kopuru soils, Molloy (1988), pp. 92-94. Poor draining type occurs on Wharekohe soils while seasonally dry type occurs on Te Kopuru soils. Vegetation type also occurs on fire induced and highly leached, non-podzolised soils and now difficult to determine which areas are natural and or induced.	Esler and Rumball (1975), Dodson et al. (1988), Conning (2001), Clarkson et al. (2011). Includes rare ecosystem: Gumland (Williams et al. 2007).	Present in Auckland
Manuka, wirerush restiad- rushland, WL2	Scrub, restiad rushland, fernland, sedgeland of abundant manuka with wirerush, tangle fern, <i>Baumea teretifolia</i> , <i>B. rubignosa</i> and <i>Schoenus brevifolius</i> .	Palustrine wetlands in Northland and Waikato lowland plains e.g. Motutangi Swamp Northland, Whangamarino Waikato within bogs of app.roximately 1500 - 7000 years old.	Elliot et al. (1985), Clarkson (1997), Clarkson et al. (2004).	Present (or was) in Auckland
Bamboo rush, wirerush restiad rushland, WL3	Restiad rushland of abundant bamboo rush and locally abundant wirerush, with occasional scrub of manuka, <i>Dracophyllum lessonianum</i> and <i>Epacris sinclairii</i> and locally <i>Lycopodiella lateralis</i> , <i>Baumea teretifolia</i> , <i>Schoenus brevifolius</i> and tangle fern. May include small embedded pools with sphagnum, <i>Utricularia</i> and <i>Drosera</i> spp.	Palustrine wetlands in Northland and Waikato lowland plains e.g. Kopuatai, Moanatuatua within raised bogs of app.roximately >7000 years old.	Campbell (1964), Wardle (1991 pp. 324-325). Clarkson (1997), Clarkson et al. (2004). Includes rare ecosystem: Domed bog (Williams et al. 2007).	Present (or was) in Auckland.

Oioi restiad- rushland/ reedland, WL10	Restiad rushland with abundant oioi, locally with large <i>Baumea</i> , <i>Bolboschoenus</i> spp., kuta and lake clubrush often with occasional raupo, scattered harakeke grading into wetland scrub on margins.	Riverine/ lacustrine wetlands in North, South and Chatham Islands occurring in freshwater areas of estuaries, coastal stream margins and in some inland areas adjacent to Lakes in the Central North Island and Southland.	Equivalent to communities 14 and 16 of Kelly (1983), Deng (2004).	Present in Auckland
<i>Baumea</i> sedgeland, WL11	Sedgeland, rushland with a high water table dominated by species of <i>Baumea</i> , <i>Lepidosperma</i> , <i>Eleocharis</i> , <i>Juncus</i> , often scattered harakeke, <i>Carex</i> spp. Locally includes oioi, tangle fern and <i>Gahnia</i> spp. which can be locally dominant. Lagg margins often grade into manuka, <i>Coprosma</i> scrub fens.	Palustrine/ riverine/ lacustrine wetlands widespread in Central North Island e.g. South Taupo Wetland while more restricted in South Island e.g. Kakapo Mire. Also occurs on the margins of oligotrophic/mesotrophic lakes e.g. Lake Waikareiti and Rotopounamu.	Burrows and Dobson (1972 "Kakapo Mire"), Clarkson (1984), Wardle (1991 pp. 321-335), Eser (1998), Pegman and Ogden (2006). Includes rare ecosystems: lagoon, lake margins (Williams et al. 2007).	Present in Auckland
Herbfield [Lakeshore turf], WL15	Herbfield and or low sedgeland of broadly two variants; i.) coastal and ii.) inland often with species in common to both variants. Coastal are often brackish and commonly include <i>Selliera radicans</i> , <i>Isolepis</i> spp., <i>Limosella</i> , <i>Lilaeopsis</i> and grade into salt marsh with increasing salinity. Inland variant commonly includes <i>Glossistigma elatinoides</i> , species of <i>Lilaeopsis</i> , <i>Carex</i> , <i>Eleocharis</i> , <i>Lobelia</i> , <i>Centrolepis</i> , <i>Hydrocotyle</i> , <i>Myriophyllum</i> , <i>Plantago</i> , <i>Ranunculus</i> , <i>Crassula</i> and other herb species.	Lacustrine wetlands associated with coastal and inland lakes in North, South and Chatham Islands e.g. Lakes Wairarapa and Forsyth and inland e.g. Lakes Manapouri, Te Anau, Waikaremona and Taupo. Most abundant on lake edges with high seasonal water height fluctuations and moderate-high fetch.	Johnson (1972), Macmillan (1979), Equivalent to community 15 of Kelly (1983), Wardle (1991 pp.303), Wells et al.(1998), Champion et al. (2001), de Lange and Murray (2008). Includes rare ecosystems: lagoon, lake margins (Williams et al. 2007).	Present in Auckland
Flaxland, WL18	Flaxland of abundant harakeke often with toetoe, species of <i>Carex</i> e.g. pukio and <i>Baumea</i> , kiokio and occasional wetland scrub, treeland of cabbage tree, <i>Coprosma</i> spp., manuka, and locally weeping matipo and <i>Olearia virgata</i> . Areas with high water tables may be dominated by pukio. May grade into wetland carr with emergent cabbage trees.	Palustrine/ riverine/ lacustrine wetlands common in North Island, especially coastal and riparian wetlands e.g. Taupo swamp (Plimmerton). Dominant type from North West Nelson e.g. Mangarakau to South Westland often with scattered manuka, kahikatea on margin.	Wardle (1977), Esler (1978), Bagnall and Ogle (1981), Wardle (1991 pp.309-320), Ravine (1991).	Present in Auckland.

Raupo reedland, WL19	Reedland of abundant raupo, locally with species of <i>Bolboschoenus</i> , <i>Schoenoplectus</i> , and <i>Baumea articulata</i> , pukio, harakeke and where unmodified with a margin of scrub of <i>Coprosma</i> species, and locally <i>Olearia virgata</i> and manuka and locally scattered kahikatea. Often occurs on lake margins or includes small ponds with shallow water/ pools with floating/rafted aquatics such as milfoils, buttercups, willowherbs, species of <i>Potamogeton</i> and <i>Isolepis</i> , <i>Azolla</i> , <i>Lemna</i> and spiked-seges (e.g. kuta).	Palustrine / riverine/ lacustrine wetlands commonly found throughout lowlands on old river oxbows, margins of lakes and flooded valleys from Northland to South Otago e.g. Lake Waihola. Now abundant on farm ponds though floristically poor.	Esler (1978), Ogden and Caithness (1982), Sandercock (1987), Eser (1998), Pegman and Ogden (2005). Includes rare ecosystems: lake margins (Williams et al. 2007).	Present in Auckland
<i>Coprosma Olearia</i> scrub, WL20	Scrub of species of <i>Coprosma</i> and locally <i>Olearia virgata</i> which can be locally dominant, with a mosaic of a wide variety of <i>Carex</i> spp. and locally kiokio. May locally include scattered harakeke, raupo, toetoe and cabbage trees.	Palustrine / riverine/ lacustrine wetlands common type in Central North Island, Southern and Eastern North Island. In South Island largely western from N.W. to Southland papa hill country. Likely to have been more abundant prior to Maori and European fires and now largely restricted to areas with a less frequent fire history.	Lake and Whaley (1995 RAP 21), Singers (2001 Three springs wetland ).	
Spinifex, pingao grassland/ sedgeland, DN2	Sedgeland, grassland of abundant spinifex, pingao with occasional shore bindweed, sand coprosma, tauhinu, sand daphne, grading into rear semi-stable dunes with open scattered dune scrub of bracken, <i>Muehlenbeckia complexa</i> , toetoe, harakeke, and cabbage trees. Locally includes matagouri, manuka, kanuka, tutu and <i>Olearia solandri</i> .	Present from Northland to Farewell Spit, then historically scattered to Buller River and in the East, to the Waimakariri River. Historically, included <i>Atriplex hollowayi</i> within the strand zone, which is now restricted to the far north.	Cockayne (1911), Esler (1970), Wardle (1991 pp. 355-356). Includes rare ecosystem: Active sand dunes (Williams et al. 2007).	Present in Auckland. Could be split into DN2.1 foredune spinifex, pingao and DN2.2 Backdune scrub.

<p>Oioi, knobby clubrush sedgeland, DN5</p>	<p>Sedgeland, herbfield of several local variants with both dry and ephemerally wet communities of range of successional stages. Dominant species include <i>Carex pumila</i>, species of <i>Gunnera</i>, <i>Selliera</i>, <i>Isolepis</i>, <i>Epilobium</i>, <i>Ranunculus</i>, <i>Leptinella</i>, <i>Lobelia</i>, <i>Colobanthus</i>, <i>Geranium</i>, <i>Hydrocotyle</i> and locally <i>Lilaeopsis novae-zelandiae</i>, <i>Myriophyllum votschii</i> and <i>Triglochin striata</i>, <i>Limosella lineata</i> and other turf forming species with older stages developing into oioi, knobby club rush, toetoe, harakeke, locally <i>Cyperus ustulatus</i>, <i>Lepidosperma australe</i>, silver tussock and <i>Raoulia</i> spp. Locally includes <i>Coprosma propinqua</i> and manuka in older successions.</p>	<p>Predominantly present in larger dunelands in association with mobile dunes and rapidly accreting coastlines. In North Island largely Northland (e.g. Aupouri, Poutu, South Kaipara) and Foxton Ecological District (South Taranaki to Paekakariki); South Island on Farewell Spit, Canterbury, Otago, Southland and Stewart Island. Often includes a mosaic of both dry deflation hollows and seasonally wet (including sandy deflation hollows, sand plains, dune slacks and low mounds). May succeed into coastal flaxland with peat accumulation.</p>	<p>Cockayne (1911), Logan and Holloway (1934), Esler (1969), Sykes and Wilson (1987), Wilson (1987), Roxburgh et al. (1994), Drobner et al. (1995), Johnson and Rogers (2002). Includes rare ecosystem: Deflation hollow, damp sand plains and dune slacks (Williams et al. 2007 ).</p>	<p>Present in Auckland e.g. Whatapu.</p>
<p>Pohutukawa treeland/ rockland, CL1</p>	<p>Coastal rockland and colluvial slopes with mosaics of treeland of abundant pohutukawa with occasional houpara, taupata, karo, kawakawa, <i>Carmichaelia</i> and <i>Hebe</i> spp., harakeke, ringaringa lily, <i>Astelia banksii</i>, northern tussock and halophytic herbs e.g. iceplant, pigweed.</p>	<p>Frost-free mainland and Island coastal cliffs and erosion prone hillslopes from Three Kings to northern Taranaki and Poverty Bay, e.g. Poor Knights, Mayor Island. Northern offshore islands e.g. Three Kings have significant component of additional endemic species.</p>	<p>Esler (1978), Baylis(1986), Clarkson (1990), Wardle (1991 pp.383-384), Lindsay et al. (2009) Includes rare ecosystem: Coastal rock stacks, coastal cliffs on acidic rock, Basic coastal cliffs and seabird guano deposits and seabird burrowed soil (Williams et al. 2007).</p>	<p>Present in Auckland. Most coastal cliffs. Includes younger scrub which could include rockstack vegetation (without seabird impact) and pohutukawa rockland</p>

<p><i>Hebe</i>, wharariki flaxland/ rockland, CL6</p>	<p>Rockland and colluvial slopes with several local variants over a wide latitudinal/ altitudinal gradient with mosaics of short-statured herbs, grasses, low forest and scrub. Dominants include; wharariki, <i>Poa anceps</i>, species of <i>Hebe</i>, <i>Gaultheria</i>, <i>Pimelea</i>, <i>Olearia</i>, <i>Sophora</i>, <i>Carmichaelia</i>, <i>Leucopogon</i>, <i>Cyathodes</i>, <i>Dracophyllum</i> and tutu locally ngaio, kanuka, <i>Chionochloa flavicans</i>, <i>Astelia solandri</i>, <i>Dianella nigra</i> and <i>Collospermum hastatum</i>. Locally sub-alpine species include <i>Hebe colensoi</i> and <i>Pimelea</i> spp. inland and local endemics on weakly weathered calcareous parent materials. Includes <i>Machaerina</i>, kiokio and rheophytic herbs, sedges, grasses and bryophytes associated with seepages, streams and rivers.</p>	<p>Predominantly sub-humid and semi-arid zones of the North Island, Northland-Auckland, East Cape to Southern Wairarapa, Rangitikei District and volcanic plateau. Wide range of geology, in eastern and Rangitikei districts predominantly on mudstone/siltstone/ sandstone, locally areas of limestone and greywacke e.g. Wairarapa Taipo's and inland closer to central ranges e.g. Kaweka Ranges. Largely volcanic geology from in Northland to Taupo volcanic zone. Also present on exposed north facing dry sites in western zone.</p>	<p>Gardener (1989), Wardle (1991 pp. 384-85). Lake and Whaley (1995), Whaley et al. (2001), Johnson and Gerbeaux (2004). de Lange and Rolfe (2008). Includes rare ecosystem: Cliffs, scarps and tors on acidic rocks, calcareous cliffs, tors and carps and Cliffs, scarps and tors on basic rocks (Williams et al. 2007 ).</p>	<p>Present in Auckland e.g. Hunua basaltic cliffs</p>
<p>Parataniwha, <i>Machaerina</i> herbfield/ sedgeland, CL9</p>	<p>Rockland and colluvial slopes with mosaics of scrub, shrub, fern, herbs and grass species and locally lianes. Dominants may include <i>Machaerina</i>, parataniwha, species of <i>Blechnum</i>, wharariki, lianes of kiekie, rata spp. and supp.lejack and scrub of tutu, hangehange and species of <i>Coprosma</i>, <i>Hebe</i>, <i>Olearia</i> and <i>Pseudopanax</i>. Rheophytic herbs, sedges, grasses and bryophytes associated with seepages, waterfalls with streams and rivers. Locally includes endemic species on weakly weathered calcareous parent materials. River cliffs include a range of rheophytic turf of short turf of herbs, sedges, grasses and bryophytes inc <i>Gunnera</i>, <i>Nertera</i> spp. and <i>Anaphalioides trinervis</i>.</p>	<p>Predominantly western distribution in humid zones and in sub-humid and semi arid zones associated with seepages and waterfalls. Lowland areas from Northland to Nelson, Coromandel and Bay of Plenty on a wide range of parent materials including volcanic, sedimentary (mudstone, siltstone and limestone) and metamorphic (greywacke).</p>	<p>Wardle (1977), Gardener (1989), Wardle (1991 pp. 384 and 391), Bayfield et al. (1991 pp.156), Heenan and Cameron (2002), Johnson and Gerbeaux (2004). Includes rare ecosystem: Cliffs, scarps and tors on acidic rocks and seepages and flushes (Williams et al. 2007 ).</p>	<p>Present in Auckland. E.g. shady basaltic cliffs, water fall margins</p>

Mangrove forest and scrub, SA1	Forest and scrub of abundant mangrove often with areas of rushland, herbfield including sea rush and oioi locally <i>Baumea juncea</i> , <i>Bolboschoenus</i> spp. and salt marsh ribbonwood, grading to sea grass herbfield on tidal flats. May locally include shell barrier beaches with a scattered herbfield of glasswort, <i>Austrostipa stipoides</i> , knobby clubrush, sea rush, sea primrose and <i>Suaeda</i> .	Frost-free estuarine hydrosystems north of 38° latitude from Raglan and Ohiwa, within tidal estuaries, inlets, river and streams.	Ward (1976 & 1991 pp.291-294), Conning (2001), Deng et al. (2004). Includes rare ecosystems: Shell barrier beaches (‘Chenier Plains’) (Williams et al. 2007).	Present in Auckland. Includes saltmarsh sedgeland/rushland, saltmarsh scrub e.g. saltmarsh ribbonwood, mingimingi, mangrove scrub and forest, shell and gravel barriers
Shore bind weed, knobby clubrush gravelfield/ stonefield, SA4	Stonefield, gravelfield with of at least four variants with halophytic herbs, sedges and vines including; glasswort, half star, shore celery, arrow grass, shore spurge, knobby club rush, shore bindweed grading into coastal scrub-vineland of <i>Coprosma</i> , <i>Muehlenbeckia</i> , and locally <i>Melicytus</i> , <i>Pimelea</i> , <i>Ozothamnus</i> species, harakeke and further inland on older beach ridges treeland locally including ngaio, taupata, akeake and kowhai and tanekaha at Miranda. On Chathams dominated by local endemics inc. <i>Myosotidium hortensium</i> and <i>Embergeria grandifolia</i> .	Most common in the South Island, Southland, Canterbury - Marlborough and West Coast. More local in the North Island in Wellington, Hawke’s Bay, Taranaki and Coromandel -Firth of Thames and small examples on the Chatham Islands. Also occur within accreting estuarine areas with large rivers e.g. Whakatiwai (Miranda) and Wairau River (Rarangi - Marlborough). Treeland successional stages are extremely rare and threatened.	Wardle (1991), Bagnall (1975). Tyrell et al. (1999). Kelly (1983) Community type 12. Williams et al. 2007. Includes rare ecosystems: Shingle beaches and Stony beach ridges (Williams et al. 2007).	Present in Auckland. Includes recent gravel/bolder beaches and stable scrub/forest bolder beaches e.g. Miranda
Herbfield [Coastal turf], SA5	Herbfield of a wide range of prostrate species including half-star, sea primrose, shore celery, <i>Zoysia minima</i> , <i>Isolepis cernua</i> , <i>Centella uniflora</i> , <i>Colobanthus muelleri</i> , <i>Hydrocotyle novae-zeelandiae</i> and species of <i>Leptinella</i> , <i>Crassula</i> , <i>Ranunculus</i> , <i>Myosotis</i> , <i>Epilobium</i> , <i>Mazus</i> and <i>Nertera</i> .	Most common and well developed within Taranaki-Wanganui, Te Tai Tapu coast - Nelson, North Westland, Otago, Southland, Fiordland and Chatham Island coastlines. Occurs on a variety of landforms from cliffs to beaches.	Rogers (1999). Rogers and Wiser 2010. Mark et al. (1988) pp.41. Includes rare ecosystem: coastal turf, coastal rock stacks, coastal cliffs on quartzose rocks, coastal cliffs on acidic rock and Marine mammal haul outs (Williams et al. 2007).	



Iceplant, glasswort herbfield/ loamfield, SA7	Mosaic of herbfield of glasswort, iceplant, pigweed, shore groundsel, shore primrose, N.Z. celery, and <i>Lepidium</i> spp., locally <i>Poa</i> spp. with scattered scrub/vineland of locally taupata, flax, ngaio, shrubby <i>Melicytus</i> , <i>Hebe</i> spp. and <i>Muehlenbeckia complexa</i> interspersed with bare ground, bird burrows and guano deposits.	Formerly widespread on suitable coastal sites throughout mainland New Zealand from Northland to Otago. Now largely restricted to predator free offshore islands. Locally in Northland-Auckland colloquially known and "Petrel scrub" Wright (1980).	Gillham 1960b. Wright (1980), Partridge (1983), de Lange et al. (1995). Includes rare ecosystems: Seabird guano deposits and Seabird burrowed soil (Williams et al. 2007 ).	Present in Auckland. Offshore islands.
Geothermal heated water and steam, GT2	Geysers, pools, springs/streams, fumaroles and sinter terraces (inc. their margins), geothermal wetlands of a range of temperature, chemical and pH conditions with associated microbes, cyanobacteria mats, bryophytes locally ferns and sedges.	Taupo Volcanic Zone, and rare examples elsewhere e.g. Ngawha.	Cody 2007. Boothroyd 2009. Includes rare ecosystem: Geothermal streamsides, fumaroles (Williams et al. 2007 ).	Present in Auckland, eg: Claris
Subterranean rockland, stonefield [Caves], CV 1	Cave ecosystems dominated by a range of terrestrial and aquatic invertebrate species, both epigeal and troglotic.	Found in karst and pseudokarst areas, associated (in New Zealand) with carbonate (limestone, marble, dolomite) and recent basaltic geology. Fauna can be archipelago like with local endemism, across isolated karst blocks.	Includes rare ecosystem: caves and cracks in karst, sinkholes, cave entrances and subterranean basalt fields (Williams et al. 2007 ).	Present in Auckland, eg:
Kanuka scrub, FI1	Kanuka scrub/forest of a range of variants. Later successional transitions include a wide range of broadleaved and podocarp trees.	Semi-arid and sub-humid zones especially on free draining soils from Northern and Eastern North Island and Eastern South Island to Otago	Equivalent to Wisser et al. (2011) [alliance 24]. Smale et al. (1983). Smale (1993) and (1994). Wardle (1991) pp.195-205.	Present in Auckland. Eg:
Manuka-kanuka scrub, FI2	Manuka-kanuka scrub of a range of variants. Later successional transitions include a wide range of broadleaved and podocarp trees and treeferns.	Predominantly semi-arid and subhumid zones from Northland to Southland on free draining soils. Locally succeeds Sward tussock grassland (FI10) and Short tussock grassland (FI11).	Equivalent to Wisser et al. (2011) [alliance 24] and [alliance 5]. Esler (1983). Smale et.al (1997). Wardle (1991) pp.195-205 .	Present in Auckland. Eg:

<p>Broadleaved scrub/forest, FI4</p>	<p>Scrub/ low forest of a wide range of variants including species of <i>Coprosma</i>, <i>Pittosporum</i>, <i>Pseudopanax</i>, <i>Melicytus</i>, <i>Olearia</i>, <i>Hebe</i>, <i>Myrsine</i>, wineberry, and locally kotukutuku, kamahi and treeferns.</p>	<p>Semi-arid to humid zones on free and poor draining soils from Northland to Stewart Island. Often succeeds bracken fernland and or manuka scrub in humid climatic zones. Dominant species reflect local forest composition. Treeferns can be locally abundant in humid locations.</p>	<p>Equivalent to Wiser et al. (2011) [alliance 23]. Equivalent to Newsome (1987) S1 Mixed indigenous scrub. Wardle (1991) pp.531-547 .</p>	<p>Present in Auckland. Eg:</p>
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